

ISSUANCE DATE AND SIGNATURE PAGE

U.S. ENVIRONMENTAL PROTECTION AGENCY
UNDERGROUND INJECTION CONTROL PERMIT: CLASS I
Permit Number AK-11007-A

In compliance with provisions of the Safe Drinking Water Act (SDWA), as amended, (42 U.S.C. 300f-300j-9), and attendant regulations incorporated by the U.S. Environmental Protection Agency (EPA) under Title 40 of the Code of Federal Regulations, Forest Oil Corporation - FOREST (permittee) is authorized to inject non-hazardous industrial waste utilizing up to two (2) Class I injection wells at the Redoubt Unit (RU) and West McArthur River Unit (WMRU), Cook Inlet, Alaska, into the Tyonek Formation, in accordance with Title 40 CFR 144.33 and the conditions set forth herein. One well is located on the offshore Osprey platform in the RU field, while the second well is located onshore, six miles away, in the WMRU field, with the bottom hole locations of both wells being offshore. Injection of hazardous waste as defined under the Resource Conservation and Recovery Act (RCRA), as amended, (42 USC 6901) or radioactive wastes are not authorized under this permit. Injection shall not commence until the operator has received written authorization from the EPA Director, Region 10 Office of Compliance and Enforcement, to inject.

All references to Title 40 of the Code of Federal Regulations are to regulations that are in effect on the date that this permit is issued. Figures and appendices are referenced to FOREST's Redoubt Unit and West McArthur River Unit Underground Injection Control (UIC) Class I Permit Application dated August 25, 2006.

This permit shall become effective on the date of the Director's signature, October ____, 2006, in accordance with 40 CFR 124.15.

This permit and the authorization to inject shall expire at midnight, October ____, 2016, unless terminated.

Signed this ____ day of October, 2006.

Signature on Original

Michael A. Bussell, Director
Office of Enforcement and Compliance
U.S. Environmental Protection Agency
Region 10 (OCE-127)
1200 Sixth Avenue
Seattle, WA 98101

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PART I
GENERAL PERMIT CONDITIONS

A. EFFECT OF PERMIT

The permittee is allowed to engage in underground injection in accordance with Title 40 CFR 144.33 and with the conditions of this permit. The underground injection activity, otherwise authorized by this permit, shall not allow the movement of fluid containing any contaminant into underground sources of drinking water, if the presence of that contaminant may cause a violation of any primary drinking water regulation under 40 CFR Part 141 or may otherwise adversely affect the health of persons or the environment. Compliance with this permit during its term constitutes compliance for purposes of enforcement with Part C of the Safe Drinking Water Act (SDWA). Such compliance does not constitute a defense to any action brought under Section 1431 of the SDWA, or any other law governing protection of public health or the environment from imminent and substantial endangerment to human health or the environment.

This permit may be modified, revoked and reissued, or terminated during its term for cause. Issuance of this permit does not convey property rights or mineral rights of any sort or any exclusive privilege; nor does it authorize any injury to persons or property, any invasion of other private rights, or any infringement of State or local law or regulations. This permit does not authorize any above ground generating, handling, storage, or treatment facilities.

This permit is based on the permit application submitted on August 25, 2006 and earlier material dated June 2, 2006 and July 5, 2006 submitted by FOREST related to the "no USDW" ruling granted by EPA dated July 24, 2006.

B. PERMIT ACTIONS

1. Modification, Reissuance or Termination

This permit may be modified, revoked and reissued, or terminated for cause as specified in 40 CFR 144.39 and 144.40. Also, the permit can undergo minor modifications for cause as specified in 40 CFR 144.41. The filing of a request for a permit modification, revocation and reissuance, or termination, or the notification of planned changes, or anticipated noncompliance on the part of the permittee does not stay the applicability or enforceability of any permit condition.

2. Transfer of Permits

This permit is not transferable to any person except after notice to the Director on APPLICATION TO TRANSFER PERMIT (EPA Form 7520-7) and in accordance with 40 CFR 144.38. The Director may require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under the SDWA.

C. SEVERABILITY

The provisions of this permit are severable, and if any provision of this permit or the application of any provision of this permit to any circumstance is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

D. CONFIDENTIALITY

In accordance with 40 CFR Part 2, any information submitted to EPA pursuant to this permit may be claimed as confidential by the submitter. Any such claim must be asserted at the time of submission in the manner prescribed in 40 CFR 2.203 and on the application form or instructions, or, in the case of other submissions, by stamping the words "confidential" or "confidential business information" on each page containing such information. If no claim is made at the time of submission, EPA may make the information available to the public without further notice. If a claim is asserted, the information will be treated in accordance with the procedures in 40 CFR Part 2 (Public Information).

Claims of confidentiality for the following information will be denied:

1. The name and address of the permittee.
2. Information which deals with the existence, absence, or level of contaminants in drinking water.

E. GENERAL DUTIES AND REQUIREMENTS

1. Duty to Comply

The permittee shall comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the SDWA and is grounds for enforcement action, permit termination, revocation and reissuance, modification, or for denial of a permit renewal application; except that the permittee need not comply with the provisions of this permit to the extent and for the duration such noncompliance is authorized in an emergency permit under 40 CFR 144.34.

2. Penalties for Violations of Permit Conditions

Any person who violates a permit condition is subject to a civil penalty not to exceed \$27,500 per day of such violation. Any person who willfully or negligently violates permit conditions is subject to a fine of not more than \$32,500 per day of violation and/or being imprisoned for not more than three (3) years.

3. Duty to Reapply

If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain a new permit. To be timely, a complete application for a new permit must be received at least 180 days before this permit expires.

4. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

5. Duty to Mitigate

The permittee shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with this permit.

6. Proper Operation and Maintenance

The permittee shall, at all times, properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of this permit.

7. Duty to Provide Information

The permittee shall provide to the Director, within a reasonable time, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee shall also provide to the Director, upon request, copies of records required to be kept by this permit.

8. Inspection and Entry

The permittee shall allow the Director, or an authorized representative, upon the presentation of credentials and other documents as may be required by law to:

- a. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records are kept under the conditions of this permit;
- b. Have access to and copy, at reasonable times, any records that are kept under the conditions of this permit;
- c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and
- d. Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by SDWA, any contaminants or parameters at any location.

9. Records

- a. The permittee shall retain records and all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit and records of all data used to complete this permit application for a period of at least three years from the date of the sample, measurement, report or application. These periods may be extended by request of the Director at any time.
- b. The permittee shall retain records concerning the nature and composition of all injected fluids until three years after the completion of plugging and abandonment. At the conclusion of the retention period, if the Director so requests, the permittee shall deliver the records to the Director. The permittee shall continue to retain the records after the three year retention period unless he delivers the records to the Director or obtains written approval from the Director to discard the records.
- c. Records of monitoring information shall include:
 - (1) The date, exact place, and time of sampling or measurements;
 - (2) The name(s) of the individual(s) who performed the sampling or measurements;
 - (3) The date(s) analyses were performed;
 - (4) The name(s) of the individual(s) who performed the analyses;
 - (5) The analytical techniques or methods used; and
 - (6) The results of such analyses.
- d. Monitoring of the nature of injected fluids shall comply with applicable analytical methods cited and described in Table I of 40 CFR 136.3 or in appendix III of 40 CFR Part 261 or in certain circumstances by other methods that have been approved by the Administrator.
- e. All environmental measurements required by the permit, including, but not limited to measurements of pressure, temperature, mechanical integrity, and chemical analyses shall be done in accordance with EPA's Quality Assurance Program Plan.
- f. As part of the COMPLETION REPORT, the operator must submit a PLAN that describes the procedures to be carried out to obtain detailed chemical and physical analysis of representative samples of the waste including the quality assurance procedures used including the following:
 - (1) The parameters for which the waste will be analyzed and the rationale for the selection of these parameters;

- (2) The test methods that will be used to test for these parameters; and
- (3) The sampling method that will be used to obtain a representative sample of the waste to be analyzed.

Where applicable, the Waste Analysis Plan (WAP) from the permit application may be incorporated by reference.

- g. The permittee shall complete a written manifest for each batch load of waste received (for waste streams that are not hard piped and continuous). The manifest shall contain a description of the nature and composition of all injected fluids, date of receipt, source of material received for disposal, name and address of the waste generator, a description of the monitoring performed and the results, a statement stating if the waste is exempt from regulation as hazardous waste as defined by 40 CFR 261.4, and any information on extraordinary occurrences.

For waste streams that are hard-piped continuously from the source to the wellhead, the permittee shall provide for continuous, recorded measurement of the discharge rate and shall provide such sampling and testing as may be necessary to provide a description of the nature and composition of all injected fluids, and to support any statements that the waste is exempt from regulation as hazardous waste as defined by 40 CFR 261.4

- h. Dates of most recent calibration or maintenance of gauges and meters used for monitoring required by this permit shall be noted on the gauge or meter. Earlier records shall be available through a computerized maintenance history database.

10. Reporting Requirements

The permittee shall give notice to the Director, as soon as possible, of any planned physical alterations or additions to the permitted facility or changes in type of injected fluid.

11. Anticipated Noncompliance

The permittee shall give advance notice to the Director of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

12. Twenty-Four Hour Reporting

- a. The permittee shall report to the Director any noncompliance which may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the permittee becomes aware of the circumstances. The following shall be included as information which must be reported orally within 24 hours:
 - (1) Any monitoring or other information which indicates that any contaminant may cause an endangerment to an underground source of drinking water.

(2) Any noncompliance with a permit condition or malfunction of the injection system.

- b. A written submission shall also be provided within five (5) days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause, the period of noncompliance, including exact date and times, and, if the noncompliance has not been corrected, the anticipated time it is expected to continue, and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

13. Other Noncompliance

The permittee shall report all other instances of noncompliance not otherwise reported at the time monitoring reports are submitted. The reports shall contain the information listed in Permit Condition E-12.b.

14. Reporting Corrections

When the permittee becomes aware that he/she failed to submit any relevant facts in the permit application or submitted incorrect information in a permit application or in any report to the Director, the permittee shall promptly submit such facts or information.

15. Signatory Requirements

- a. All permit applications, reports required by this permit and other information requested by the Director shall be signed by a principal executive officer of at least the level of vice-president, or by a duly authorized representative of that person. A person is a duly authorized representative only if:
 - (1) The authorization is made in writing by a principal executive of at least the level of vice-president.
 - (2) The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field, superintendent, or position of equivalent responsibility. A duly authorized representative may thus be either a named individual or any individual occupying a named position.
 - (3) The written authorization is submitted to the Director.
- b. If an authorization under paragraph a. of this section is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of paragraph a. of this section must be submitted to the Director prior to or together with any reports, information or applications to be signed by an authorized representative.
- c. Any person signing a document under paragraph a. of this section shall make the following

certification:

"I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

F. PLUGGING AND ABANDONMENT

1. Notice of Plugging and Abandonment

The permittee shall notify the Director no later than 45 days before conversion or abandonment of the well.

2. Plugging and Abandonment Report

The permittee shall plug and abandon the well as provided in the Well Construction and Integrity - Abandonment Procedures of the August 25, 2006 permit application (Section 6.5), which is hereby incorporated as a part of this permit. Within 60 days after plugging any well the permittee shall submit a report to the Director in accordance with 40 CFR 144.51(p). EPA reserves the right to change the manner in which the well will be plugged if the well is not proven to be consistent with EPA requirements for construction and mechanical integrity. The Director may ask the permittee to update the estimated plugging cost periodically.

3. Cessation Limitation

After a cessation of operations of two years, the permittee shall plug and abandon the well in accordance with the plan unless he:

- a. Provides notice to the Director;
- b. Demonstrates that the well will be used in the future; or
- c. Describes actions or procedures, satisfactory to the Director that the permittee will take to ensure that the well will not endanger underground sources of drinking water during the period of temporary abandonment. These actions and procedures shall include compliance with the technical requirements applicable to active injection wells unless waived by the Director.

4. Cost Estimate for Plugging and Abandonment

- a. The permittee estimates the 2006 cost of plugging and abandonment (P&A) of the permitted two (2) Class I wells to be approximately \$ 475,000 (P&As to be done rig-less - See Exhibits 6-5 and 6-6 in permit application).

- b. The permittee must submit financial assurance and a revised estimate in April of each year. The estimate shall be made in accord with 40 CFR 144.62.
- c. The permittee must keep at the facility during the operating life of the facility the latest plugging and abandonment cost estimate.
- d. When the cost estimate changes, the documentation submitted under 40 CFR 144.63(f) shall be amended as well to ensure that appropriate financial assurance for plugging and abandonment is maintained continuously.
- e. The permittee must notify the Director by registered mail of the commencement of a voluntary or involuntary proceeding under Title 11 (Bankruptcy), U.S. Code, naming the owner or operator as debtor, within 10 business days after the commencement of the proceeding.

G. FINANCIAL RESPONSIBILITY

The permittee shall maintain continuous compliance with the requirement to maintain financial responsibility and resources to close, plug, and abandon the underground injection well. If the financial test and corporate guarantee provided under 40 CFR 144.63(f) should change, the permittee shall immediately notify the Director. The permittee shall not substitute an alternative demonstration of financial responsibility for that which the Director has approved, unless it has previously submitted evidence of that alternative demonstration to the Director and the Director notifies him that the alternative demonstration of financial responsibility is acceptable.

PART II WELL SPECIFIC CONDITIONS

A. CONSTRUCTION

1. Casing and Cementing

The UIC regulations require the permittee to case and cement the well(s) to prevent the movement of fluids into strata other than the authorized injection interval (see II.C.3, below). Casing and cement shall be installed in accordance with a casing and cement program approved by the Director and in accordance with Class I well construction practices and the State of Alaska Regulations.

As stated earlier, the two (2) proposed candidate Class I wells are currently operating as Class II disposal wells and were drilled in 1998 (well WMRU 4D) and 2001 (well RU D1). They were drilled, cased, cemented, and completed according to the State of Alaska regulations Title 20, AAC 25.412 and AAC 25.030 that were in effect at the time. EPA has reviewed the construction details and well history of each of the proposed two candidate Class I wells submitted by FOREST and approves their use as Class I wells, subject to the mechanical integrity (both internal and external) requirements being successfully demonstrated by the permittee, as outlined in this permit. FOREST is authorized to substitute alternate candidate wells in the event any of the above two candidate Class I wells fail to demonstrate mechanical integrity. However, FOREST shall identify the substitute candidate Class I well(s) and give a 30-day written notice with well data to EPA prior to conducting the mechanical integrity test (MIT) on the substitute candidate Class I well(s). Again, no Class I well shall be placed on injection prior to successfully demonstrating its mechanical integrity and approval from EPA.

Details on each well's construction and operation and well history can be found in Section 6.0 of the Permit Application submitted by FOREST dated August 25, 2006.

2. Tubing and Packer Specifications

The wells shall inject fluids through tubing with a packer. The EPA regulation 40 CFR 146.12(c) requires a packer to be set immediately above the injection zone and lists a number of factors to be considered in determining the distance. The current State regulation 20 AAC 25.412 requires that injection packers be placed within 200 feet of the top of the injection perforations, unless approved otherwise based on thickness and depth of the confining zone. The EPA regulation 40 CFR 146.12(c) requires a packer to be set immediately above the injection zone and lists a number of factors to be considered in determining the distance. Well WMRU 4D has the packer set at 5587 feet MD which is 121 feet above the top of the perforated interval at 5708 feet MD and approximately 400 feet below the upper confining zone. The well RU D1 packer is set at 7620 feet MD which is 1920 feet below the upper confining zone at 5700 feet MD, but is 596 feet above the top of the existing perforated interval at 8216 feet MD. EPA does not see a conflict between the well RU D1 current packer setting depth and the regulations because of the injection depth and the 1920 feet of standoff. The packer was set shallow at this depth so that the secondary disposal interval from 7650-7900 feet could be perforated for

additional injection capacity (if needed at a later date) without the use of a drilling rig. Therefore, EPA approves the packer setting depths as they now exist. However, in the well RU D1, EPA will be requiring the operator to run an initial multi-finger casing caliper survey opposite the exposed section of the casing between the top of the existing perforations at 8216 feet MD and the current packer setting depth at 7620 feet to assess corrosion and/or erosion impacts from past injection, prior to initiation of injection activities. At the discretion of the Director, test procedures and subsequent frequency of tests may be revised.

3. New Wells in the Area of Review

New wells within the area of review (1/4 mile radius of each well) shall be constructed in accordance with the Alaska Oil and Gas Conservation Commission Regulations Title 20 - Chapter 25. Further, all wells in the area of review shall have casing cemented to the formation throughout the entire section from the well's TD or the base of the Tyonek formation to above the upper confining zone.

B. CORRECTIVE ACTION

The closest well to well WMRU 4D is the Pan American WF Unit #2 located approximately 1600 feet north of the well. Pan American WF #2 was properly drilled, cemented, and then abandoned as documented in Exhibit 4-1. No other wells are within 1/2 mile of well WMRU 4D and the closest well to well RU D1 is well RU D3 at a distance of 3000 horizontal feet at a TVD of 7650 feet. Therefore no corrective actions are required on offset wells within the 1/4 mile AOR to prevent fluids from moving above the confining zone. If the applicant later discovers that a well or wells within the AOR require(s) corrective action to prevent fluid movement, then the applicant shall inform the EPA upon such discovery and provide a corrective action plan for EPA review and approval. If the EPA or the permittee discovers that fluids have moved above the confining zone along a wellbore within the AOR, then injection shall cease until the fluid movement problem can be diagnosed and corrected.

C. WELL OPERATION

1. Prior to Commencing Injection

Since the two proposed wells are currently Class II disposal active injectors and are being re-permitted as Class I injectors, injection operations pursuant to this permit may not commence until:

- a. The permittee has submitted two copies of COMPLETION FORM FOR INJECTION WELLS (EPA Form 7520-9), see APPENDIX; and
 - (1) The Director has inspected or otherwise reviewed the injection well completion form and data and finds it is in compliance with the conditions of the permit; or
 - (2) The permittee has not received notice from the Director of intent to inspect or otherwise review the injection well data within thirteen (13) days of receiving the

COMPLETION REPORT in which case prior inspection or review is waived and the permittee may commence injection.

- a. The operator demonstrates that the well has mechanical integrity as described in Part II.C.3. Mechanical Integrity below and the permittee has received notice from the Director that such a demonstration is satisfactory. The permittee shall notify EPA at least two weeks prior to conducting this initial test so that an EPA representative may be present.
- b. The operator will conduct a step-rate test using available platform injection pumps and permanent injection line to the disposal well, and attempt to obtain a breakdown pressure. Since the operator has submitted sufficient data regarding the fracture gradient in the August 25, 2006 permit application (est. fracture gradient (FG) of 0.87 to 0.93 pounds per square inch (psi)/foot (ft) for Tyonek consistent with Cook Inlet experience), a report on the FG data does not need to be submitted to EPA at this time.

2. During Injection

The WMRU and RU Class I facilities shall be manned 24 hours per day by trained and qualified operators while injection is occurring.

3. Mechanical Integrity

a. Standards

The injection wells must have and maintain mechanical integrity pursuant to 40 CFR 146.8.

b. Prohibition Without Demonstration of Mechanical Integrity

Injection operations are prohibited after the effective date of this permit unless the permittee has conducted the following tests and submitted the results to the Director:

- (1) Annulus testing to date for the proposed two wells has conformed to State of Alaska regulation 200 AAC 25.412 which requires the casing to be tested to 0.25 psi/ft multiplied times the vertical depth of the packer, but not to exceed 70% of the minimum yield strength of the casing. This criteria generates a minimum surface test pressure of 1,891 psi for well RU D1 and 1,252 psi for well WMRU 4D respectively. The proposed wells have all recently passed the State 4-year testing cycle. EPA approves allowing the tubing/casing annulus to continue to be pressure tested per State guidelines for not less than 30 minutes as follows:

<u>Well</u>	<u>Minimum Test Pressure (psig)</u>
RU D1	2000
WMRU D4	1600

Pressure shall show a stabilizing tendency. That is, the pressure may not decline more than 10 percent during the test period and shall experience less than one-third of its total loss in the last half of the test period. If the total loss exceeds 5% or if the loss during the second 15 minute period is equal to or greater than one half the *losses* during the first 15 minutes, the permittee may extend the test period for an additional 30 minutes to demonstrate stabilization. An initial pressure test (standard annulus pressure test - SAPT) will be required prior to the well first being placed on injection as a Class I well. After acquiring this initial Class I pressure test data, the SAPT will be required annually until expiration of the ten (10) year permit period or until abandonment of the facility or the well. At the discretion of the Director, and depending on the results of the initial data, the frequency for demonstrating internal mechanical integrity (no leaks in the tubing-casing annulus or in the tubing-packer assembly) may be revised (either increase or decrease in frequency) as specified and approved by the Director.

- (2) A temperature survey (conducted after an appropriate shut-in period), oxygen activation/water flow log (conducted at an injection pressure at least equal to the maximum continuous injection pressure observed in the previous six months to the degree this is mechanically possible when initializing Class I injection operations) or other equivalent fluid movement/confinement logs shall be performed to detect movement of fluids in vertical channels adjacent to the wellbore to determine that the confining zone is not fractured. Copies of all logs shall be accompanied by a descriptive and interpretive report. Fluid movement/confinement diagnostic logs will be run prior to initiation of Class I injection activities. After acquiring this initial data, the diagnostic logs will be required once every two years until expiration of the ten (10) year permit period or until abandonment of the facility or the well. At the discretion of the Director, and depending on the results of the initial Class I data, the frequency for demonstrating external mechanical integrity (no flow behind pipe and isolation above injection interval) and utilizing alternative diagnostic techniques, may be revised (either increase or decrease in frequency) as specified and approved by the Director.
- (3) An initial caliper survey (either a 24-arm or 40-arm memory caliper) will be run in well RU D1 to monitor the condition of the tubing and the exposed section of the casing in the interval between the top of the existing perforations (at 8216 feet MD) and the existing packer set at 7620 feet MD. Also, the operator will obtain an initial caliper survey of the tubing in well WMRU 4D prior to initiation of Class I injection activities. The frequency of subsequent caliper surveys to monitor corrosion and/or erosion impacts of the tubing and/or the exposed section of the casing will be at the discretion of the EPA Director and dependent on the initial caliper survey results.

c. Terms and Reporting

- (1) Two (2) copies of the log(s) and two (2) copies of a descriptive and interpretive report of the mechanical integrity tests identified in 3.b(2) shall be submitted within 45 days of completion of the logging.
- (2) Mechanical integrity shall also be demonstrated by the pressure test in 3.b. (1) any time the tubing is removed from the well or if a loss of mechanical integrity becomes evident during operation. The permittee shall report the results of such tests within 45 days of completion of the tests.
- (3) After the initial Class I mechanical integrity demonstration, the permittee shall notify the Director of intent to demonstrate mechanical integrity at least 30 days prior to subsequent demonstrations.
- (4) The Director will notify the permittee of the acceptability of the mechanical integrity demonstration within 13 days of receipt of the results of the mechanical integrity tests. Injection operations may continue during this 13 day review period. If the Director does not respond within 13 days, injection may continue.
- (5) In the event that the well fails to demonstrate mechanical integrity during a test or a loss of mechanical integrity occurs during operation, the permittee shall halt operation immediately and shall not resume operation until the Director gives approval to resume injection.
- (6) The Director may, by written notice, require the permittee to demonstrate mechanical integrity at any time.

4. Injection Zone

Injection shall be limited to the existing Class II injection zone intervals in the Tyonek Formation. The injection zone for well WMRU 4D extends from 5040 to 6258 feet MD (current perforations from 5708 to 6130 feet) as shown on the well WMRU No. 4 (original borehole) log. The injection zone for well RU D1 extends from 5780 to 8700 feet MD (current perforations from 8216 to 8450 feet). (See Exhibits 6-1 and 6-2).

Disposal into well WMRU 4D currently averages 2,000 BPD of produced water at an average injection pressure of 2800 psi. It is anticipated that most of this water will soon be diverted into the Hemlock oil reservoir for EOR benefit. Injection into well RU D1 is expected to average less than 1,000 BPD (intermittent injection) at average injection pressure of 2500-3500 psi. Again, disposal operations and volumes will be on an intermittent basis, due to most produced water being used for Hemlock oil reservoir EOR purposes.

5. Injection Pressure Limitation

Injection pressures shall not initiate new fractures or propagate existing fractures in the upper confining zone as that stratigraphic interval is described in the FOREST Type Logs (Exhibits 3-4 and 3-9) of the Permit Application. Due to the anticipated small disposal volumes (and

intermittent batch injection) and typical injection rates of between 2 to 4 BPM (barrels per minute) the injection rates are expected to average less than 3,000 psi. Typically, most injection wells decline to zero pressure within hours after injection ceases and this practice is expected to continue. If minor plugging of the near wellbore with entrained solids occurred, the maximum injection pressure could reach or exceed 5000 psi or the wellhead psi limitation (whichever comes first), whereupon a well stimulation treatment would be needed. Therefore, the maximum injection pressure, measured at the wellhead, during normal injection activities shall not exceed 3500 psi except as follows.

In the event of a plant shut-down or outage, there may be instances where injection pressures exceed 3500 psi (unrelated to fluid injection activities or due to near wellbore plugging as stated earlier). In such instances, the Permittee shall notify the Director or his designee by telephone or electronic mail within twenty-four (24) hours of the initial exceedance of either of the above limitations and shall submit a written incident report not later than ten (10) days thereafter.

6. Annulus Pressure

The annulus between the tubing and the long string casing shall be filled with a corrosion inhibited non-freezing solution. A positive surface pressure will be maintained as in the past at levels up to 2000 psig or the maximum casing limitation, whichever comes first, for monitoring purposes (to incorporate thermal effects on annulus pressures).

7. Injection Fluid Limitation

Only exempt and non-hazardous, non-exempt wastes similar to the wastes listed in the permit application shall be injected. In the event that third party wastes are accepted the third party must certify that hazardous waste or radioactive wastes are not injected. FOREST has submitted a formal Waste Analysis Plan (WAP) for the WMRU and RU facilities to EPA. The WAP establishes procedures for handling, monitoring, controlling batch deliveries and other related operational matters and will require the EPA Directors approval prior to initiation of Class I injection activities.

NOTE: Neither hazardous waste as defined in 40 CFR 261 nor radioactive wastes other than naturally occurring radioactive material (NORM) from pipe scale shall be injected for disposal.

D. MONITORING

1. Monitoring Requirements

Samples and measurements collected for the purpose of monitoring shall be representative of the monitored activity.

2. Continuous Monitoring Devices

Continuous monitoring devices shall be installed, maintained, and used to monitor injection pressure and rate for those streams that are hard-piped and continuous, and to monitor the annulus pressure between the tubing and the long string casing. Calculated flow rates are not acceptable except as a back-up system if the primary continuous injection rate device malfunctions. Since continuous annulus monitoring devices are not currently installed at the existing proposed injection wells, EPA approves the annulus data to be visually/manually inspected and recorded every 12 hours. However, all new wells to be drilled and constructed will need to have continuous monitoring devices installed for monitoring the injection and annulus pressures. (For clarification, “continuous monitoring” refers to alarms and analog readings such as pressure and rate that are displayed in the control room. Instrumentation is currently used to monitor key parameters. Alarms alert operators of high levels and can/do shut down pumps automatically if the high-high level is triggered. In this context “continuous” is a real-time tracking operation; although continuous data is not recorded).

3. Alarms and Operational Modifications

- a. The permittee shall install, continuously operate, and maintain alarms to detect excess injection pressures and significant changes in the inner annulus. These alarms must be of sufficient placement and urgency to alert operators in all operating spaces.
- b. Plans and specifications for the alarms shall be submitted to the Director prior to the initiation of injection.

E. REPORTING REQUIREMENTS

1. Quarterly Reports

The permittee shall submit quarterly reports to the Director containing the following information:

- a. Monthly average, maximum and minimum values for injection pressure, rate, and volume shall be reported on INJECTION WELL MONITORING REPORT (EPA Form 7520-8).
- b. Graphical plots of daily injection pressure and rate.
- c. Daily monitoring data in an electronic format.
- d. Physical, chemical, and other relevant characteristics of the injected fluid.
- e. Any well work over or other significant maintenance of downhole or injection-related surface components.
- f. Results of all mechanical integrity tests performed since the previous *quarterly* report.
- g. Any other tests required by the Director.

2. Report Certification

All reporting and notification required by this permit shall be signed and certified in accordance with Part I.E.15., and submitted to the following address:

UIC Manager, Ground Water Protection Unit
U.S. Environmental Protection Agency (OCE-127)
1200 Sixth Avenue
Seattle, Washington 98101

APPENDIX A
REPORTING FORMS

Enclosed are EPA Forms:

7520-7	APPLICATION TO TRANSFER PERMIT
7520-8	INJECTION WELL MONITORING REPORT
7520-9	COMPLETION FORM FOR INJECTION WELL